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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,310	10/31/2003	Ian Robinson	NG(ST)-6564	5457

26294 7590 03/04/2008
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EXAMINER

LEE, SIU M

ART UNIT	PAPER NUMBER
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2611

MAIL DATE	DELIVERY MODE
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03/04/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/700,310	ROBINSON, IAN	
	Examiner	Art Unit	
	SIU M. LEE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-5,7-11,34,37,44 and 48-64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7-11,34,37,44 and 48-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1, 3-5, 7-11, 34, 37, 44, 48-64 have been considered but are moot in view of the new ground(s) of rejection.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory

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double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1, 3, 4 and 5 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 14 of U.S. Patent No. 7,146,144 B2 (called "the Patent") in view of Calderbank et al. (US 2005/0201481 A1) and Komrmusch (US 5,933,062).

The following is a comparison of claim 1 of the instant application and claim 13 of the Patent.

Instant application		US 7,146,144 B2	
Claim 1	<p>A multi-carrier transmitter assembly, comprising:</p> <p>a digital exciter that provides a digital multi-carrier signal from baseband data;</p> <p>a digital-to-analog converter that converts the digital multi-carrier signal into an analog multi-carrier signal;</p>	Claim 14 (including limitation of claims 1, 12 and 13)	<p>A frequency agile exciter assembly, comprising:</p> <p>a delta-sigma modulator, having associated frequency characteristics, that produces a digital output signal;</p> <p>a digital-to-analog converter that converts the digital output signal into an analog signal;</p>

	<p>a signal distributor that deserializes the analog multi-carrier signal into a plurality of analog carrier signals, the signal distributor comprising at least one stopband filter having at least one stopband, each of the at least one stopband having an associated center frequency, the digital exciter being operative to adjust the respective center frequencies of the at least one stopband; and</p> <p>a plurality of antennas, each of the plurality of antennas transmitting at least one of the plurality of analog carrier signals</p>		<p>a clock circuit that provides a clock signal to the delta signal modulator and the delta-sigma modulator and the digital-to-analog converter; and</p> <p>a frequency control that controls at least of the clock circuit, the delta-sigma modulator, and the digital-to-analog converter to alter the frequency characteristics of the delta-sigma modulator;</p> <p>the analog signal comprising a plurality of analog signals having respective associated frequencies, the assembly further comprising a channelizing filter that separates and filters the plurality of analog signals;</p> <p>the frequency control being operative to vary the center</p>
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			frequency of a plurality of passband associated with the channelizing filter; the channelizing filter comprising a surface acoustic wave filter comprising at least one micromechanical structure that can be electrically configured to change the center frequency of plurality of passband associated with the filter.
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(1) Regarding claim 1:

From the comparison, the Patent fails to disclose (a) the signal distributor comprising at least one stopband filter having at least one stopband, each of at least one stopband having an associated center frequency and (b) providing the plurality of analog signals to respective antenna for transmission.

With respect to (a), the Patent discloses that the passband filter are surface acoustic wave filter.

Kommrusch discloses a surface acoustic wave filter that is tunable and can be tuned into a stopband filter or a passband filter (in a circuit, where a SAW resonator is used in series between a generator and load, it produces a passband when the series

elements goes resonant, and a stopband filter when C_0 goes anti-resonant with the effective inductance of the series (column 4, lines 64-67).

It is desirable to have filters that can be tuned into a stopband filter and a passband filter because it increase the flexibility of the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Kommrusch in the system of the Patent to increase the flexibility of the system.

With respect to (b), Calderbank et al. discloses using a plurality of antennas for transmission (figure 3, antenna 116a and 116b).

It is desirable to use a plurality of antenna for transmission because it provides the benefit of diversity. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Calderbank et al. in the method of the Patent to improve the performance of the method.

(2) Regarding claim 3:

Claim 14 of the Patent discloses that the at least one stopband filter comprising a surface acoustic wave (SAW) filter having at least one electrically actuatable micromechanical structure.

(3) Regarding claim 4:

Claim 13 of the Patent discloses that the signal distributor further comprising at least one passband filter having at least one passband, each of the at least one passband having an associated center frequency, the digital exciter being operative to adjust the respective center frequency of the at least one passband.

(4) Regarding claim 5:

Claim 13 of the Patent discloses a given passband filter from the at least one passband filter having a plurality of passband, each of the respective center frequencies of the plurality of passband being electrically adjusted by the exciter.

4. Claim 8 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 14 of U.S. Patent No. 7,146,144 B2 (called "the Patent") in view of Calderbank et al. (US 2005/0201481 A1) and Komrmusch (US 5,933,062) and further in view of Lau et al. (US 6,291,924 B1).

The Patent, Calderbank et al. and Komrmusch disclose all the subject matter as discuss in claim 1 except a given stopband filter from the at least one passband filter having a plurality of stopbands, each of respective center frequencies of the plurality of stopband being electrically adjustable by the exciter.

However, Lau et al. discloses an adjustable SAW device in figure 22 that can be adjusted by means of the switches 158 and control lines 160 to take on characteristics which provide passbands having preselected center frequencies and bandwidths, stopband having a preselected width and frequencies , as well as preselected multiple passbands.

It is desirable to have filters that can be tuned into a stopband filter and a passband filter because it increase the flexibility of the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the

teaching of Kommrusch in the system of the Patent to increase the flexibility of the system.

5. Claim 8 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 14 of U.S. Patent No. 7,146,144 B2 (called "the Patent") in view of Calderbank et al. (US 2005/0201481 A1) and Kommrusch (US 5,933,062) and further in view of Jago et al. (US 2003/0171674 A1).

The Patent, Calderbank et al. and Kommrusch disclose all the subject matter as discuss in claim 1 except the signal distributor comprising a time division demultiplexer.

However, Jago et al. discloses a signal distributor (signal separator 56) comprising a time division demultiplexer (the signal separator 56 in figure 3 is implemented using a time-division demultiplexer 64, paragraph 0022, lines 4-5).

It is desirable for the signal distributor comprising a time division demultiplexer because it eliminates difference in channel selection timing. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Jago et al. in the system of the Patent, Calderbank et al. and Kommrusch to simplify the system.

6. Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 14 of U.S. Patent No. 7,146,144 B2 (called "the Patent") in view of Calderbank et al. (US 2005/0201481 A1) and Kommrusch (US 5,933,062) and further in view of Pratt (US 6,664,921 B2).

The Patent, Calderbank et al. and Kommrusch disclose all the subject matter as discuss in claim 1 except the signal distributor comprising a plurality of decoders, providing respective despreading codes to a multi-carrier signal.

However, Pratt discloses the signal distributor (plurality of channel 167) comprising a plurality of decoders, providing respective despreading codes to a multi-carrier signal (the plurality of channels 167 each containing a mixer 167A which receives the same respective code as that applied in respect of the relevant antenna in mixer 150C, this has the effect of isolating the representation of the respective received signal at the output of the mixer 167A, this output representation then being split into plural sub-channel 169, column 10, lines 3-10).

It is desirable for the signal distributor comprising a plurality of decoders, providing respective despreading codes to a multi-carrier signal because the coded signal can withstand higher noise. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Pratt in the system of the Patent, Calderbank et al. and Kommrusch to improve the performance of the system.

7. Claims 10 and 11 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 14 of U.S. Patent No. 7,146,144 B2 (called "the Patent") in view of Calderbank et al. (US 2005/0201481 A1) and Kommrusch (US 5,933,062) and further in view of Naidu et al. (US 6,128,470).

(1) Regarding claim 10:

The Patent, Calderbank et al. and Komrmusch discloses all the subject matter as discuss in claim 1 except the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location.

However, Naidu et al. discloses the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location (the system comprises a plurality of remote antenna unit 68₁, 68₂, 70₁, 70₂ connect to the base station equipment 50₁ and 50₂ in figure 2, column 1, lines 43-54).

It is desirable for the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location because it reduces the cumulative noise in a distributed antenna network (column 2, lines 48-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Naidu et al. in the system of the Patent, Calderbank et al. and Komrmusch to improve the quality of the system.

(2) Regarding claim 11:

Naidu et al further discloses that a second of the at least one antenna being located at a third location, spatially remote from the first location and the second location (the system comprises a plurality of remote antenna unit 68₁, 68₂, 70₁, 70₂ connect to the base station equipment 50₁ and 50₂ in figure 2, column 1, lines 43-54).

8. Claims 34 and 37 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 13 of U.S. Patent No. 7,146,144 B2 (called "the Patent") in view of Calderbank et al. (US 2005/0201481 A1).

(1) regarding claim 34:

The following is a comparison of claim 34 of the instant application and claim 13 of the Patent.

Instant application		US 7,146,144 B2	
Claim 34	A method of transmitting a multi-carrier signal, comprising: generating a digital multi-carrier signal at an exciter; converting the digital multi-carrier signal into an analog multi-carrier signal; distributing the analog multi-carrier signal into a plurality of analog signal, where distributing the analog multi-carrier signal comprises filtering a plurality of copies of the multi-carrier analog signal respective tunable filters, at least one of the	Claim 13 (including limitation of claims 1 and 12)	A frequency agile exciter assembly, comprising: a delta-sigma modulator, having associated frequency characteristics, that produces a digital output signal; a digital-to-analog converter that converts the digital output signal into an analog signal; a clock circuit that provides a clock signal to the delta signal modulator and the delta-sigma modulator and the digital-to-analog converter; and

	<p>tunable filter being a multiband tunable filter; and</p> <p>providing the plurality of analog signals to respective antennas for transmission.</p>		<p>a frequency control that controls at least of the clock circuit, the delta-sigma modulator, and the digital-to-analog converter to alter the frequency characteristics of the delta-sigma modulator;</p> <p>the analog signal comprising a plurality of analog signals having respective associated frequencies, the assembly further comprising a channelizing filter that separates and filters the plurality of analog signals;</p> <p>the frequency control being operative to vary the center frequency of a plurality of passband associated with the channelizing filter.</p>
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From the comparison, the Patent fails to disclose "providing the plurality of analog signals to respective antenna for transmission".

However, Calderbank et al. discloses using a plurality of antennas for transmission (figure 3, antenna 116a and 116b).

It is desirable to use a plurality of antenna for transmission because it provides the benefit of diversity. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Calderbank et al. in the method of the Patent to improve the performance of the method.

(2) Regarding claim 37:

The plurality of passband filters frequency deserialized the multi-carrier signal.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 44, 48, 49, and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Nuutinen et al. (US 2003/0016771 A1) and Pratt (US6,664,921 B2).

(1) Regarding claim 44:

Caimi et al. discloses a receiver assembly, comprising:

a plurality of antennas that each receive an analog signal comprising at least one frequency band of interest and at least one frequency band containing an interfering signal (filters in the filter/antenna block 136A, 136B, and 136C in figure 19, it is inherent that each antenna can received an analog signal comprising at least one frequency band of interest and at least one frequency band containing an interfering signal);

a processing component (signal processor 146A, 146B, and 146C in figure 19) that receives a representation of each analog signal (each of the signal processor receive a representation of each antenna in the filter/antenna block 136A, 136B, and 136C as shown in figure 19) and produce a control signal (147A, 147B, and 147C in figure 19) from each representation, representing an associated antenna, specifying the at least one frequency band containing the interfering signal (it may also be preferable to adjust the spectral filtering provided by the filters/antennas 136A-136C using a control signal provided to the filters/antennas 136A-136C; via control signal 147A-147C, paragraph 0079, lines 2-5); and

Caimi et al. discloses a plurality of electrically adjustable passband filters (filters in the filter/antenna block 136A-136C in figure 19) , each electrically adjustable passband filter being associated with one of the plurality of antennas (each filter in the filter/antenna block 136A-136 is associated with an antenna), a given electrically adjustable passband filter being electrically adjustable to change respective associated center frequencies of at least one passband associated with the filter in response to the control signal (the integrated assembly 136 is tunable by a control signal in a control line

for adjusting the filter characteristics, including center frequency and bandwidth, paragraph 0074, lines 1-6) associated with the associated antenna.

Caimi et al. fails to explicitly disclose (a) a plurality of electrically adjustable stopband filter, each electrically adjustable stopband filter being associated with one of the plurality of antenna to change respective associated center frequencies of at least one stopband associated with the filter in response to the control signal and (2) an analog-to-digital converter that creates a digital representation of each analog signal.

With respect to (a), Nuutinen et al. discloses a receiver with band-stop filter 614 (614a and 614b in figure 6B) that is tunable to a sub-band that contain the interference and filtered out the interference signal, paragraph 0025, lines 16-18 and paragraph 0028, lines 14-19 and paragraph 0029, lines 1-9.

It is desirable to have a plurality of electrically adjustable stopband filter, each electrically adjustable stopband filter associated with one of the plurality of antenna, a given electrically adjustable stopband filter being electrically adjustable to change respective associated center frequencies of at least one stopband associated with the filter in response to the control signal associated with the associated antenna of the given adjustable filter as to attenuate the specific at least one frequency band within the analog signal received at the associated antenna of the given adjustable filter because it can filter out the interference signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Nuutinen et al. in the system of Caimi et al. to improve the signal quality of the system.

With respect to (b), in paragraph 0079, lines 9-10 of Caimi et al. states that the filtering process can be carried out in analog or digital domain. It would have been obvious that if the filtering is perform in digital domain, the analog signal received by the antenna would have to be convert to digital signal by a analog-to-digital converter in order for the filter to perform filtering in digital domain.

Pratt discloses an analog-to-digital filter that creates a digital representation of each analog signal (ADC 165 in figure 4, column 9, lines 60-65).

It is desirable to have an analog-to-digital converter that creates a digital representation of each analog signal because digital data can withstand interference better than analog signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. and Nuutinen et al. to improve the reliability of the system.

(2) Regarding claim 48:

Caimi et al. further disclose a signal combiner (combiner 144 in figure 19) that combines the analog signals from the plurality of antenna into a multi-carrier signal (since each filter/antenna 136A-136C is with a different center frequency, the output of the combiner 144 is a multi-carrier signal, paragraph 0074-0075).

Caimi et al. fails to disclose an analog-to-digital converter that converts the analog multi-carrier signal into a digital multi-carrier signal.

However, Pratt discloses an analog-to-digital filter after the combiner 155 in figure 4 that creates a digital representation of each analog signal (ADC 165 in figure 4, column 9, lines 60-65).

It is desirable to have an analog-to-digital converter that creates a digital representation of each analog signal because digital data can withstand interference better than analog signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. and Nuutinen et al. to improve the reliability of the system.

(3) Regarding claim 49:

Pratt further discloses a combiner comprising at least one mixer (mixers 150C) for downconverting analog signals, a given mixer being associated with a respective one of the at least one antenna and having an associated intermediate frequency (the mixers 150C serve as down converters, converting the received signals to an intermediate frequency, column 9, lines 57-59).

It is desirable for the combiner comprising at least one mixer for downconverting analog signals, a given mixer being associated with a respective one of the at least one antenna and having an associated intermediate frequency because it can remove interference in the signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. and Nuutinen et al. to improve the performance of the system.

(4) Regarding claim 61:

Pratt further discloses that the signal combiner (combiner 155 and PRBS code generator 153) comprising a plurality of coders (code 1 to K) that provide respective spreading codes to the analog carrier signals, the respective spreading codes being

mutually orthogonal (column 9, lines 46-51, the despreading codes may be signals constituting an orthogonal set, column 4, lines 20-21).

It is desirable for the signal combiner comprising a plurality of coders that provide respective spreading codes to the analog carrier signals, the spreading codes being mutually orthogonal because the signal can be decoded in a noisier environment. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Pratt in the system of Caimi et al. and Nuutinen et al. to improve the performance of the system.

11. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Nuutinen et al. (US 2003/0016771 A1) and Pratt (US6,664,921 B2) as applied to claim 48 above, and further in view of Chitrapu et al. (US 2006/0072520 A1).

Caimi et al., Pratt and Chitrapu et al. disclose all the subject matter as discuss in claim 48 except the signal combiner comprising a frequency multiplexer.

However, Chitrapu discloses a frequency multiplexer (428 in figure 4) that combines the various control signals into one signal (paragraph 0022, lines 16-18).

It is desirable for the signal combiner comprising a frequency multiplexer because it prevent the need for duplicate processing circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Chitrapu et al. in the system of Caimi et al. and Pratt to reduce the complexity of the system.

12. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Nuutinen et al. (US 2003/0016771 A1) and Pratt (US 6,664,921 B2) as applied to claim 48 above, and further in view of Yin (US 2005/0218984 A1).

Caimi et al., Nuutinen et al. and Pratt disclose all the subject matter as discuss in claim 48 except the signal combiner comprising a bypass, such that a carrier signal from the at least one of the pluralities of antennas can bypass the signal combiner.

However, Yin discloses a combiner (int frmr 216 in figure 2) that has a bypass mode and when the combining function of the combiner is not required, the combiner is bypassed (paragraph 0050, lines 16-18).

It is desirable for the signal combiner comprising a bypass, such that a carrier signal from the at least one of the pluralities of antennas can bypass the signal combiner because it can reduce process time for the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Yin in the system of Caimi et al., Nuutinen et al. and Pratt to reduce the processing time of the system.

13. Claims 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Nuutinen et al. (US 2003/0016771 A1) and Pratt (US 6,664,921 B2) as applied to claim 48 above, and further in view of Naidu et al. (US 6,128,470).

(1) Regarding claim 54:

Caimi et al., Nuutinen et al. and Pratt discloses all the subject matter as discuss in claim 12 except the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location.

However, Naidu et al. discloses the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location (the system comprises a plurality of remote antenna unit 68₁, 68₂, 70₁, 70₂ connect to the base station equipment 50₁ and 50₂ in figure 2, column 1, lines 43-54).

It is desirable for the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location because it reduces the cumulative noise in a distributed antenna network (column 2, lines 48-50). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Naidu et al. in the system of Caimi et al., Nuutinen et al. and Pratt to improve the quality of the system.

(2) Regarding claim 55:

Naidu et al further discloses that a second of the at least one antenna being located at a third location, spatially remote from the first location and the second location (the system comprises a plurality of remote antenna unit 68₁, 68₂, 70₁, 70₂ connect to the base station equipment 50₁ and 50₂ in figure 2, column 1, lines 43-54).

14. Claims 56, 57, 58 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Pratt (US6,664,921 B2).

(1) Regarding claim 56:

Caimi et al. discloses a receiver assembly, comprising:

a plurality of antennas that each receive an analog signal comprising at least one frequency band of interest and at least one frequency band containing an interfering signal (filters in the filter/antenna block 136A, 136B, and 136C in figure 19, it is inherent that each antenna can received an analog signal comprising at least one frequency band of interest and at least one frequency band containing an interfering signal);

a processing component (signal processor 146A, 146B, and 146C in figure 19) that receives a representation of each analog signal (each of the signal processor receive a representation of each antenna in the filter/antenna block 136A, 136B, and 136C as shown in figure 19) and produce a control signal (147A, 147B, and 147C in figure 19) from each representation, representing an associated antenna, specifying the at least one frequency band containing the interfering signal (it may also be preferable to adjust the spectral filtering provided by the filters/antennas 136A-136C using a control signal provided to the filters/antennas 136A-136C; via control signal 147A-147C, paragraph 0079, lines 2-5); and

a plurality of electrically adjustable passband filters (filters in the filter/antenna block 136A-136C in figure 19) ; each electrically adjustable passband filter being

associated with one of the plurality of antennas (each filter in the filter/antenna block 136A-136 is associated with an antenna), a given electrically adjustable passband filter being electrically adjustable to change respective associated center frequencies of at least one passband associated with the filter in response to the control signal (the integrated assembly 136 is tunable by a control signal in a control line for adjusting the filter characteristics, including center frequency and bandwidth, paragraph 0074, lines 1-6) associated with the associated antenna of the given adjustable filter as to attenuate the specific at least one frequency band within the analog signal received at the associated antenna of the given adjustable filter (by changing the center frequency of the filters in the filter/antenna 136A-136C, signal with frequency band outside of the center frequency will be filter out by the filters in filter/antenna 136A-136C, therefore, attenuating the specific at least one frequency band within the analog signal received at the associated antenna of the given adjustable filter).

Caimi et al. fails to explicitly disclose an analog-to-digital converter that creates a digital representation of each analog signal.

However, in paragraph 0079, lines 9-10, it states that the filtering process can be carried out in analog or digital domain. It would have been obvious that if the filtering is perform in digital domain, the analog signal received by the antenna would have to be convert to digital signal by a analog-to-digital converter in order for the filter to perform filtering in digital domain.

Pratt discloses an analog-to-digital filter that creates a digital representation of each analog signal (ADC 165 in figure 4, column 9, lines 60-65).

It is desirable to have an analog-to-digital converter that creates a digital representation of each analog signal because digital data can withstand interference better than analog signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. to improve the reliability of the system.

(2) Regarding claim 57:

Caimi et al. further disclose a signal combiner (combiner 144 in figure 19) that combines the analog signals from the plurality of antenna into a multi-carrier signal (since each filter/antenna 136A-136C is with a different center frequency, the output of the combiner 144 is a multi-carrier signal, paragraph 0074-0075).

Caimi et al. fails to disclose an analog-to-digital converter that converts the analog multi-carrier signal into a digital multi-carrier signal.

However, Pratt discloses an analog-to-digital filter after the combiner 155 in figure 4 that creates a digital representation of each analog signal (ADC 165 in figure 4, column 9, lines 60-65).

It is desirable to have an analog-to-digital converter that creates a digital representation of each analog signal because digital data can withstand interference better than analog signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. to improve the reliability of the system.

(3) Regarding claim 58:

Pratt further discloses a combiner comprising at least one mixer (mixers 150C) for downconverting analog signals, a given mixer being associated with a respective one of the at least one antenna and having an associated intermediate frequency (the mixers 150C serve as down converters, converting the received signals to an intermediate frequency, column 9, lines 57-59).

It is desirable for the combiner comprising at least one mixer for downconverting analog signals, a given mixer being associated with a respective one of the at least one antenna and having an associated intermediate frequency because it can remove interference in the signal. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine the teaching of Pratt in the system of Caimi et al. to improve the performance of the system.

(4) Regarding claim 61:

Pratt further discloses that the signal combiner (combiner 155 and PRBS code generator 153) comprising a plurality of coders (code 1 to K) that provide respective spreading codes to the analog carrier signals, the respective spreading codes being mutually orthogonal (column 9, lines 46-51, the despread codes may be signals constituting an orthogonal set, column 4, lines 20-21).

15. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Pratt (US6,664,921 B2) as applied to claim 57 above, and further in view of Chitrapu et al. (US 2006/0072520 A1).

Caimi et al. and Pratt disclose all the subject matter as discuss in claim 57 except the signal combiner comprising a frequency multiplexer.

However, Chitrapu discloses a frequency multiplexer (428 in figure 4) that combines the various control signals into one signal (paragraph 0022, lines 16-18).

It is desirable for the signal combiner comprising a frequency multiplexer because it prevent the need for duplicate processing circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Chitrapu et al. in the system of Caimi et al. and Pratt to reduce the complexity of the system.

16. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Pratt (US6,664,921 B2) as applied to claim 57 above, and further in view of Lee (US 6,473,416 B1).

Caimi et al. and Pratt disclose all the subject matter as discuss in claim 57 except the signal combiner comprising a code division multiple access multiplexer.

However, Lee discloses a code division multiple access multiplexer (mux 100 in figure 3) that combines CDMA signals inputted through a plurality of channels (column 4, lines 39-41).

It is desirable for the signal combiner comprising a code division multiple access multiplexer because it prevent the need for duplicate processing circuit. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to

employ the teaching of Chitrapu et al. in the system of Caimi et al. and Pratt to reduce the complexity of the system.

17. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Pratt (US6,664,921 B2) as applied to claim 57, and further in view of Yin (US 2005/0218984 A1).

Caimi et al. and Pratt disclose all the subject matter as discuss in claim 57 except the signal combiner comprising a bypass, such that a carrier signal from the at least one of the pluralities of antennas can bypass the signal combiner.

However, Yin discloses a combiner (int frmr 216 in figure 2) that has a bypass mode and when the combining function of the combiner is not required, the combiner is bypassed (paragraph 0050,lines 16-18).

It is desirable for the signal combiner comprising a bypass, such that a carrier signal from the at least one of the pluralities of antennas can bypass the signal combiner because it can reduce process time for the system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Yin in the system of Caimi et al. and Pratt to reduce the processing time of the system.

18. Claims 63 and 64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caimi et al. (US 2004/0227683 A1) in view of Pratt (US6,664,921 B2) as applied to claim 57 above, and further in view of Naidu et al. (US 6,128,470).

(1) Regarding claim 63:

Pratt and Caimi et al. discloses all the subject matter as discuss in claim 12 except the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location.

However, Naidu et al. discloses the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location (the system comprises a plurality of remote antenna unit 68₁, 68₂, 70₁, 70₂ connect to the base station equipment 50₁ and 50₂ in figure 2, column 1, lines 43-54).

It is desirable for the analog-to-digital converter and the digital processing assembly being located at a first location, and a first of the at least one antenna being located at a second location, spatially remote from the first location because it reduces the cumulative noise in a distributed antenna network (column 2, lines 48-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Naidu et al. in the system of Caimi et al. and Pratt to improve the quality of the system.

(2) Regarding claim 64:

Naidu et al further discloses that a second of the at least one antenna being located at a third location, spatially remote from the first location and the second location (the system comprises a plurality of remote antenna unit 68₁, 68₂, 70₁, 70₂ connect to the base station equipment 50₁ and 50₂ in figure 2, column 1, lines 43-54).

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Toivola (US 6,081,515) discloses a method and arrangement relating to signal transmission. Rybicki et al. (US 7,184,490 B1) discloses a low power distribution transmitter. Isikawa et al. (US 5,048,690) discloses an antenna supervising apparatus comprising a standing wave ratio measuring unit. Naidu et al. (US 5,805,983) discloses a system and method for equalizing the delay time for transmission paths in a distributed antenna network. Zhu et al. (US 2002/0047494 A1) discloses a programmable surface acoustic wave filter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIU M. LEE whose telephone number is (571)270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Examiner
Art Unit 2611
2/27/2008



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